

| OPCODE       | COMMAND MEANING                  |
|--------------|----------------------------------|
| 00 0000 0000 | NO INFORMATION                   |
| 00 0000 0001 | RESERVED                         |
| 00 0000 0010 | PC TRACE GAP                     |
| 00 0000 0011 | REPEAT INSTRUCTION               |
| 00 0000 0100 | COUNTER START                    |
| 00 0000 0101 | COUNTER OVERFLOW/COUNTER VALUE   |
| 00 0000 0110 | RESERVED                         |
| 00 0000 0111 | COMMAND ESCAPE                   |
| 00 0000 1xxx | EXCEPTION OCCURRED               |
| 00 0001 0xxx | TIMING SYNC POINT                |
| 00 0001 1xxx | MEMORY REFERENCE SYNC POINT      |
| 00 0010 xxxx | PC SYNC POINT/FIRST/LAST/TRIGGER |
| 00 010x xxxx | SAME PC                          |
| 00 011x xxxx | CPU AND ASIC DATA                |
| 00 10xx xxxx | RESERVED                         |
| 00 11xx xxxx | MEMORY REFERENCE BLOCK           |
| 01 xxxx xxxx | BRANCH/BEGINNING OF PARAMETER    |
| 10 xxxx xxxx | CONTINUE                         |
| 11 xxxx xxxx | TIMING                           |

FIG. 3

## TIMING PACKET EXAMPLES

[illegible]

FIG. 4

### TIMING SYNC PACKET

|                    |                  |
|--------------------|------------------|
| TIMING SYNC HEADER | 3-BIT PC SYNC ID |
|--------------------|------------------|

FIG. 5

0901-6870

0901-6870

0901-6870



0901-0690



0901-6870

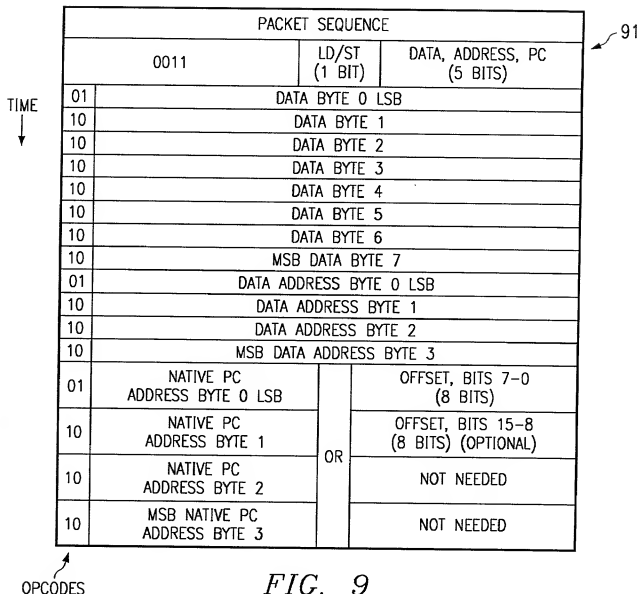
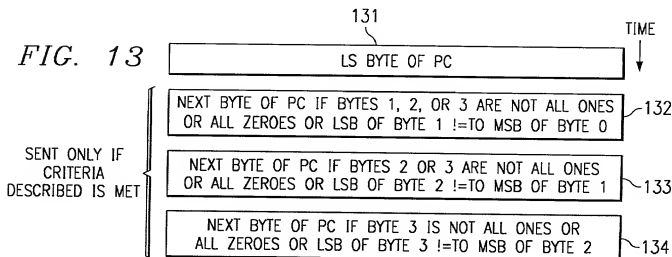
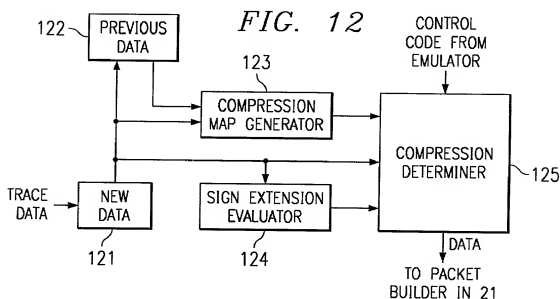
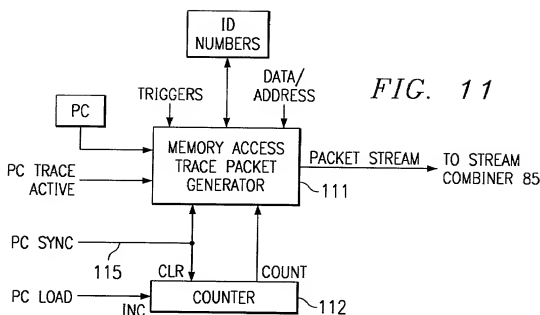


FIG. 9

## MEMORY REFERENCE SYNC POINT

| OPCODE   | PARAMETER FIELD (3-BITS) |
|----------|--------------------------|
| 00 00011 | MSB SYNC ID LSB          |

FIG. 10



## COMPRESSION EXAMPLE 0

FIG. 15

### COMPRESSION EXAMPLE 1

## COMPRESSION EXAMPLE 2

## COMPRESSION EXAMPLE 2

### COMPRESSION EXAMPLE 3

### COMPRESSION EXAMPLE 3

FIG. 17

| COMPRESSION EXAMPLE 4    |  |  |
|--------------------------|--|--|
| PREVIOUS DATA            |  | 10000011: 00000100 11111111: 11111111                                |
| NEW DATA                 |  | 11111111: 11111111 11111111: 11111111                                |
| COMPRESSION BIT MAP SENT |  | YES BECAUSE TWO OR MORE BYTES NOT COVERED BY SIGN EXTENSION COMPRESS |
| SEND BYTES               |  | DROPPED DROPPED DROPPED DROPPED                                      |
|                          |  | NO BYTES ARE SENT  |

FIG. 18

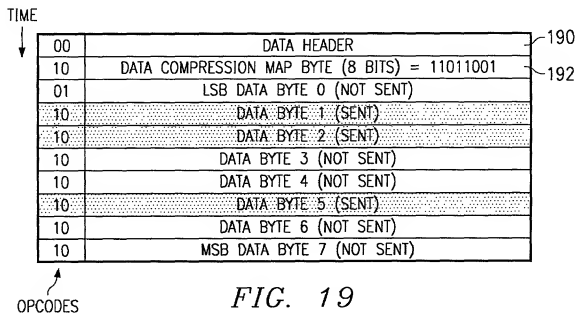
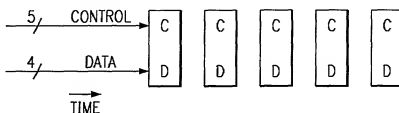


FIG. 19

FIG. 20  
(PRIOR ART)

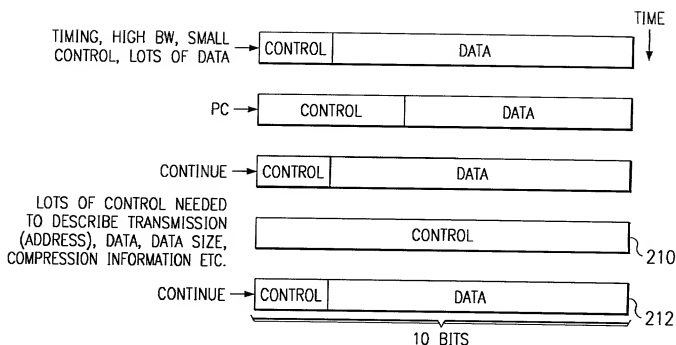


FIG. 21

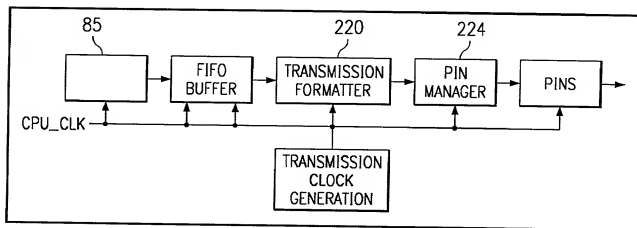


FIG. 22

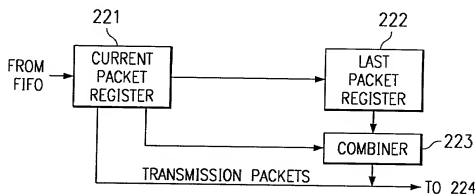


FIG. 22A



| 6 TRACE PACKETS TRANSMITTED AS 10 TRANSMISSION PACKETS |   |    |   |    |   |    |   |    |   |
|--|---|----|---|----|---|----|---|----|---|
| 10   |   | 10 |   | 10 |   | 10 |   | 10 |   |
| 6  | 6 | 6  | 6 | 6  | 6 | 6  | 6 | 6  | 6 |
| TIME →   |   |    |   |    |   |    |   |    |   |

FIG. 23

|    |  |    |  |    |  |    |  |    |  |
|----|--|----|--|----|--|----|--|----|--|
| 10 |  | 10 |  | 10 |  | 10 |  | 10 |  |
| 12 |  | 12 |  | 12 |  | 12 |  | 12 |  |

FIG. 23A

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 16 |    | 16 |    | 16 |    | 16 |    | 16 |

FIG. 23B

| REGISTER 221 |                             |   |   |   |   |   |   |   |   | REGISTER 222 |       |                                |   |   |   |   |   |   |   |   |   |
|--------------|-----------------------------|---|---|---|---|---|---|---|---|--------------|-------|--------------------------------|---|---|---|---|---|---|---|---|---|
| #            | CURRENT TRANSMISSION PACKET |   |   |   |   |   |   |   |   |              | #     | INCOMPLETE TRANSMISSION PACKET |   |   |   |   |   |   |   |   |   |
| 0            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | EMPTY |                                |   |   |   |   |   |   |   |   |   |
| 1            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | 0     | 9                              | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | 1     | 9                              | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | 1     | 9                              | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | 2     | 9                              | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 3            | 9                           | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0            | 2     | 9                              | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

FIG. 24

10/10

221  
↓

222  
↓

| # | REGISTER |   |   |   |   |   |   |   |   |   | #     | REGISTER |   |   |   |   |   |   |   |   |   |
|---|----------|---|---|---|---|---|---|---|---|---|-------|----------|---|---|---|---|---|---|---|---|---|
| 0 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | EMPTY |          |   |   |   |   |   |   |   |   |   |
| 0 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 1     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2 | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 1     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

251  
↓

FIG. 25

|     |          |   |   |   |   |   |   |   |   |   |       |          |   |   |   |   |   |   |   |   |   |     |
|-----|----------|---|---|---|---|---|---|---|---|---|-------|----------|---|---|---|---|---|---|---|---|---|-----|
| 221 |          |   |   |   |   |   |   |   |   |   | 222   |          |   |   |   |   |   |   |   |   |   |     |
| #   | REGISTER |   |   |   |   |   |   |   |   |   | #     | REGISTER |   |   |   |   |   |   |   |   |   |     |
| 0   | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | EMPTY |          |   |   |   |   |   |   |   |   |   |     |
| 262 | Z        | - | - | Z | E | R | O | E | S | - | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 261 |
|     | Z        | - | - | Z | E | R | O | E | S | - | Z     | -        | - | Z | E | R | O | E | S | - | - |     |
| 263 | Z        | - | - | Z | E | R | O | E | S | - | Z     | -        | - | Z | E | R | O | E | S | - | - |     |
| 264 | 1        | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0     | 1        | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0   |
|     | 2        | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0     | 1        | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0   |

FIG. 26

|     |          |   |   |   |   |   |   |   |   |   |       |          |   |   |   |   |   |   |   |   |   |
|-----|----------|---|---|---|---|---|---|---|---|---|-------|----------|---|---|---|---|---|---|---|---|---|
| 221 |          |   |   |   |   |   |   |   |   |   | 222   |          |   |   |   |   |   |   |   |   |   |
| #   | REGISTER |   |   |   |   |   |   |   |   |   | #     | REGISTER |   |   |   |   |   |   |   |   |   |
| 0   | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | EMPTY |          |   |   |   |   |   |   |   |   |   |
| Z   | -        | - | Z | E | R | O | E | S | - | - | 0     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| Z   | -        | - | Z | E | R | O | E | S | - | - | Z     | -        | - | Z | E | R | O | E | S | - | - |
| 1   | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Z     | -        | - | Z | E | R | O | E | S | - | - |
| 1   | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 1     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2   | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 2     | 9        | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

FIG. 27